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ABSTRACT

The ongoing flow of monetary assistance and technological transfer from developed to developing countries is examined and its success gauged. Two examples are cited: "The Mumias Sugar Company--A Success Story in Kenya," and, "The Sao Francisco River Power Development in Brazil--A Disaster along the River." The paper also discusses what appropriate technology means, its role in development, and means of strengthening this role and/or effectiveness. Definitions used in reference to appropriate technology are listed. Four strategies for transferring technology to developing countries are identified and discussed: top-down strategy (in which technology is transferred to the educated elite with the aim that it will trickle-down to the poor); intermediate technology strategy (which provides a step to bridge the gap between indigenous and advanced technology); use of multinational corporations strategy (in which large corporations are used to transfer technology); and basic needs strategy (the transfer of only that technology appropriate to the specific needs of the indigenous population). The shortcomings of the strategies are investigated, followed by plans for strengthening technology transfer strategies and their major components: needs assessment, target group involvement, evaluation/follow-up, and relevance of technology transfer in developing projects. Brief conclusions/recommendations address definitions, strategy shortcomings, and indigenous technologies. (JMM)

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"A DISCUSSION OF STRATEGIES FOR APPROPRIATE TECHNOLOGY TRANSFER TO DEVELOPING COUNTRIES"

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INTRODUCTION

It has been nearly three decades since most of the developing countries attained their independence and throughout that period there has been an ongoing flow of assistance both in terms of funds and technology transfer from the developed countries to the developing countries. In dollar amounts, the transfer in its entirety sums up to a staggering figure of hundreds of billions of dollars. In spite of these inputs, the economies of many developing countries still remain in tatters. In many parts of Africa, Asia, and Latin America millions of people still go hungry each day of the year and malnutrition is widespread. The health conditions for the majority of the people in these regions of the world still leave a lot to be desired as countless number of families live in abject conditions and resign themselves hopelessly to the mercy of prevalent/dangerous vectors and diseases. If anything, the much talked about technological transfer and assistance to the developing countries has only encountered marginal success in some of these developing countries.

In an attempt to put things into perspective in his text, The Africans: A Triple Heritage, (1986), the internationally renowned Professor Ali Mazrui cited Dr. Julius Nyerere, founding President of Tanzania as having once said:

> While the great powers are trying to get to the moon, we are trying to get to the village. Well, the great powers have been to the moon and back, and are now even communicating with the stars. But in Africa we are still trying to reach the village. What's more, the village is getting even more remote, receding with worsening communications even further into the distance. (p. 201)

Thus, if the situation depicted in the above statement by Dr. Nyerere about the plight of an African village is to be the yardstick of measuring how far aid packages and/or technological transfers have gone in improving the well-being of developing countries, one could say not very much has been accomplished over the span of time in consideration in spite of the assistance.

However, regardless of the gloomy picture that is apparent in the state of affairs of many developing countries' economic, nutritional, and health conditions, the assistance from the developed countries has not been all in vain. Some progress has actually been made over the years, though admittedly there is still a lot of room for improvement. The following are two case studies citing examples of positive and negative results.

The Mumias Sugar Company - A Success Story in Kenya: By the mid 1970s, Kenya had only two major sugar companies. These two companies were not producing enough to meet the domestic demand, hence the country's meager foreign exchange was seriously being drained by sugar imports. In a joint effort between the Kenyan government, a United Kingdom firm, Booker McConnell, United Kingdom development aid funds, with assistance from the World Bank, and the East African Development Bank, a satellite-farm, or sugarcane outgrowers system, was adopted in a densely populated area in Western Kenya at Mumias. The majority of the people in this area had depended heavily on subsistence farming as their sole source of livelihood. The satellite-farm was started at Mumias because the local farmers had shown

an interest in growing sugar cane and also because of the favorable climatic and soil conditions. At the beginning of the enterprise there were two basic questions that had to be answered: 1) how to grow the cane itself successfully, and 2) how to turn the cane into sugar.

There was a suggestion to have all the cane grown in a large estate, transferring land from the possession of the owners to the company, and hiring labor to cultivate it. This alternative was rejected by the government decision-makers who participated in planning the project. They insisted that the main objective was to provide cash income for small farmers. In order to avoid the temptation by farmers to turn all their land into sugarcane production, and neglect raising food for themselves and their families, restrictions were placed on the average farmers to devote only four acres to cane growing. As a matter of fact, no farmer was allowed to put more than half his/her land into cane production and consequently lose his/her food source and become dependent on cane growing.

The major technologies embedded in the Mumias Sugar Project that have been successfully transferred to the Kenyan people are: training of technicians; managerial skills, organizational efficiency, and laboratory research on improving sugar cane varieties, and disease resistance. Included in the technical assistance provided were seed cane and fertilizers under a state supervised credit system, with free technical advice.

The nucleus sugarcane complex employs 2,500 people, 60 of them foreigners. But through comprehensive training courses sponsored by Booker's it was projected that by 1980 there should be no more than six foreigners employed by the Mumias Sugar Company. An active branch of the Kenya Union of Sugar Plantation Workers is reportedly on site and has "good working relations" with the employers. Although Booker's does not state the terms of its own contract with the Kenyan government, it is presumed that there is a "fade-out" arrangement as more Kenyans are trained each year to supply skilled management. Not to mention the 7,500 people directly employed either in growing or milling, a thriving commercial/artisan sector has subsequently sprouted in the Mumias area in response to the availability of employment and increased income in the area.

Before the satellite-farm was started, the area was characterized by the movement of young and middle-aged people to Nairobi and other urban centers. After only one year of operation, the project was producing beyond its projected capacity and the drift of people toward Nairobi had been reversed. The youth were being retained in the area and many natives of Mumias had come home in response to the cash income the project had generated. In short, the Mumias area had been transformed into a relatively developed area with market access roads, good housing provisions for the 1,250 employees: supplied with running water; most have toilets, and the housing is well integrated into the surrounding community. A free clinic plus social and recreational facilities have also been furnished. The design of the project included a provision that gave all foreign personnel incentives to train Kenyans and "work themselves out of the job" (George, (1977), p. 198).

The success of Mumias Sugar Complex is such that Booker's is reportedly moving on to Mumias II, in yet another joint venture with the government, to be designed and operated along the same lines and produce twice as much sugar as Mumias I.

About this success model in Mumias, Kenya, Susan George (1977) stated:

> It is, of course, highly doubtful that, without the World Bank, UK overseas development funds and especially the strict attitude of the government insisting that social goals be placed first, Mumias would have turned out to be anything other than a classic sugar plantation on the model of many that Booker McConnell manages and/or owns in other parts of the World. In the absence of such outside influences there is nothing to prevent a company from aiming for the most economically profitable method of production....in another sense, the agribusiness must be controlled, for when it is, it has a contribution to make. (p. 158)

The Sao Francisco River Power Development in Brazil - A Disaster Along the River: In collaboration with the Brazilian government and other multilateral lending agencies, the World Bank sponsored a power development in urban areas which has wreaked havoc on the lives of the rural poor. About 70,000 inhabitants along the 200 mile stretch of the Sao Francisco River were uprooted from their homes and livelihood due to floods caused by the overflow from the river as a result of the hydroelectric power dam construction in northeast Brazil. The World Bank had committed $400 million of financial assistance for this power development and irrigation scheme. After the floods, local church officials reported that the people have not been sufficiently compensated for their losses nor offered any decent alternatives.

It is ironic that the irrigation waters had been channeled to serve large-scale, mechanized farms financed by the Intra-American Development Bank and the produce from these farms was destined for export markets, while the uprooted people were left languishing in huge losses.

The Catholic bishop in the area later reported that chronic food shortages and exorbitant prices were aggravating the already high degree of malnutrition because food must be imported into the area. Furthermore, the electricity generated from the dam was transmitted to the coastal cities (Lappe, et.al, (1981), p. 47).

In essence, the two examples given above are very representative, but with extremely different results, of many development projects which are ostensibly designed for technology transfer to the developing countries.

It is true some changes have taken place in the developing countries, and as a matter of fact, there are isolated cases where tremendous headways have been made in the so-called Newly Industrialized Countries (NICs): e.g., South Korea, Brazil, Taiwan, and Argentina. However, the majority of the developing countries have few decisive progress reports to show despite the assistance from outside their borders coupled with their own national efforts and/or strategies over the years in question.

These facts and examples suggest that it is possible to postulate that there is a missing link between the total effort and financial inputs directed to alleviate the development problems in the developing countries in proportion to the magnitude and rate of progress that has taken place in these countries.

There are several factors or reasons that could be considered as possible causes of the apparent lack of major breakthroughs in the developments of the developing countries.

High on the list of the possible factors or reasons are: no needs assessment, misdesigned projects (in terms of scale, and/or target group involvement), misdirected assistance and wrong target groups. Other related factors could be failures in technology transfer, the use of inappropriate channels for technology transfer or assistance and possibly, the assistance programs themselves which become obstacles to development.

Because of the complexities and large number of variables contributing to lack of satisfactory progress in developing countries, it is beyond the scope of this paper to treat them all. This paper will focus on the discussion of technology transfer.

STATEMENT OF THE PROBLEM

An examination of empirical studies has shown that technology transfer has been deemed "high," "low," "intermediate," as well as "appropriate" or "inappropriate" by authors such as Schumacher (1973), Hans (1977) and Congdon (1977). But the relevance of technology transfer to positive progress in the developing countries itself has been challenged. In an article entitled, "Appropriate Technology: 'The Movement Has Only A Few Clothes On'", Eckaus (1987) wrote:

> ...Yet appropriate technology remains a nebulous concept with indistinct boundaries and vague criteria. With a few exceptions only, the logic is dubious; and the experience, which now encompasses more than two decades, is disappointing. Appropriate Technology has generated little scholarly analysis and never provided a set of data that could be studied for general insights. Instead, it has provided only a collection of stories with many inconsistencies. Yet the approach contains some important insights, and the people involved are as well-intentioned a group as one is ever likely to meet. (p. 63)

What is appropriate and what is inappropriate technology transfer? Are these just terminologies being used for some ulterior political purposes? If a sugar company originally sponsored by donor agencies has succeeded in Kenya, does that mean the same model could succeed in Uganda or Honduras? How about the disaster that was apparently caused by the floods in the power development in Brazil, does that make all power developments in the developing countries inappropriate? Easy or hard as these questions may be to understand by various people, the one thing that emerges from them is that, there is no universally agreed upon definition of appropriate technology and/or its transfer to the developing countries. Indeed, the concept itself is ill-defined. Is appropriate technology transfer necessarily the key to development in developing countries? It may be irrelevant.

It is probably common knowledge that the majority of people in the developing countries live in the rural areas. They are usually far removed from the government decision-makers in the capital cities and other industrial/commercial centers where foreign designers of technology transfer

meet with the indigenous elite to make choices of technologies that are supposedly 'appropriate' to the nation and the people. Could technology be 'appropriate' if it were designed with the full cooperation and/or involvement of the target groups such as the rural inhabitants and not just by dealing with government decision-makers alone? Once a technology has been identified and channeled to the developing countries, is there any need to do a follow-up and/or evaluation about the success or failure or whether it is meeting the original objectives? These and many other questions should be asked to illuminate the issue of technology transfer to the developing countries and what part it has played in the sluggish pace of developments in these countries.

The problem to be addressed in this paper is what appropriate technology transfer actually means, its role in development, and means of strengthening its role and/or effectiveness.

OBJECTIVES OF THE PAPER

1. Develop a working definition of appropriate technology to the developing countries.

2. Identify and discuss selected strategies for technology transfer.

3. Identify and discuss some shortcomings of selected strategies for technology transfer.

4. Discuss plans to strengthen technology transfer strategies to the developing countries.

DISCUSSION/ANALYSIS

Develop a Working Definition of Appropriate Technology

While the debate about technology transfer and its consequences on the pace of progress in the developing countries continues, one particular topic has dominated that debate in more ways than one. The topic is 'appropriate' technology (AT). The literature on AT shows that there are as many definitions and names for AT as there are authors who have written about it. The following are some definitions or terminologies used in reference to AT.

Appropriate Technology - (AT) is the generic term for a wide range of technologies characterized by any one or several of the following features: low investment cost per workplace, low capital investment per unit of output, organizational simplicity, high adaptability to a particular social or cultural environment, sparing use of natural resources, low cost of final product or potential for employment (Jequier and Blanc, (1983), p. 10).

Intermediate Technology - (IT) is a technology which stands halfway between traditional and modern technology. Intermediate is a relative notion: in Black Africa, the ox-drawn plow is an intermediate technology (more sophisticated than the traditional hoe, but less complex than the tractor) but in Southeast Asia, it can be considered as a traditional technology (Jequier and Blanc, (1983), p. 10).

Alternative Technology - is a term used to describe new types of equipment or new organizational forms which represent a viable alternative to the existing 'mainstream' technologies of today. Examples: 'self-help' housing schemes instead of conventional urban development programs, or small-scale organic farming instead of large-scale, energy intensive cultivation techniques (Jequier and Blanc, (1983), p. 10).

Socially Appropriate Technology (SAT) - is a technology which is likely to have beneficial effects on income distribution, employment, work satisfaction, health and social relations. Example: a vaccine against malaria or schistosomiasis (Jequier and Blanc, (1983), p. 10).

Village Technology - small-scale technology aimed primarily at meeting the basic needs of rural dwellers in the developing countries. This concept was pioneered among others by the United Nations Children's Fund (UNICEF). Examples: small scale on-farm storage systems for food, low-cost dryers (Jequier and Blanc, (1983), p. 10).

Community Technology (CT) - a term widely used in the American counterculture and by such writers as Karl Hess, is a small-scale technology which does not require a complex infrastructure, which is specifically tailored to the needs and capabilities of small urban or rural communities, and which seeks to foster community participation in the decision making process (Jequier and Blanc, (1983), p. 10).

According to the Organization for Economic Cooperation and Development (OECD) (1974), in Choice and Adaptation of Technology in Developing Countries:

> The expression "appropriate technology" seems the most widely favored term, if only because it begs the important "questions"....In its most normally used sense, (some might say "in its correct logical use"), the expression appropriate: has empirical content only by reference to a particular situation involving the person who is using it. A technology is only "appropriate" (or "inappropriate") by reference to criteria or objectives which themselves must be specified in empirical terms. (p. 22)

Because of the variations in definitions and perceptions about what is 'inappropriate', especially in the context of technology to be transferred to the developing countries, there is an urgent need now more than ever to establish a "working definition" of appropriate technology. The intrinsic concern for such a definition is borne out of the belief that if designers, planners, and the target groups could get together or at least consult with each other at the infant stage of technological design, then misconceptions, ignorance, suspicions, and doubts could be cleared and where necessary compromises be made for a meaningful implementation and utilization of a transferred technology. Up until now, designers, planners, and/or donors tend to have their own biases and perceptions about what is 'appropriate' or 'inappropriate' for their target group sometimes in direct contrast to the aspirations of the target group who, probably have strongly held biases of their own. With consultations at an initial stage of design, suitable technologies that would leave all the parties involved happy could be the outcome.

On the basis of the opinion expressed in the foregoing paragraph, a 'working definition' of appropriate technology would be - a technology that is first and foremost people oriented by nature and in practice. The primary features of such a technology would include: 1) a needs assessment at the outset, 2) skill level that reflects the aspirations of the target group and, 3) cost that is within the resource endowment of the target group.

Identification and Discussion of Selected Strategies

The following are some of the strategies for transferring technology to the developing countries: 1) The Top-down strategy, 2) Intermediate technology strategy, 3) The use of multinational corporations strategy, 4) Basic needs strategy.

Top-down strategy - The basis of this strategy is to direct technology transfer to the educated elite in the developing countries with the aim that the technology will eventually trickle-down to the poor in the country. Under this strategy the question to be asked is whether it would be more successful to transfer a technology via a selected powerful group rather than going directly to the poor or lower income groups who must be the ultimate recipients. Who benefits under this strategy and how far does it really go in activating developments in the recipient countries?

Intermediate technology strategy - This strategy (an outgrowth of E. F. Schumacher's philosophy) is based on the fact that the gap between the two technologies (that of the developed versus the developing countries) is so enormous that a transition overnight is almost impossible.

Symbolically speaking, Schumacher gave an analogy that equates the indigenous technology of a typical developing country with a $1 technology and that of the developed countries with a $1000 technology. He further stated if effective help is to be brought to those who need it most, the technology would fall in some intermediate position within that range (Schumacher, (1979), p. 10).

Therefore, there is a need to make moderate choices of technology. Let us say, again symbolically speaking, a $100 technology for transfer to the developing countries. Schumacher (1973) observed that such an intermediate technology would be immensely more productive than indigenous technology, but would also be immensely cheaper than the sophisticated, highly capital intensive technology of modern industry. (p. 169)

The use of multinational corporations strategy - The use of corporations to transfer technology to the developing countries is based on their ability to compete and capture markets internationally. As such they can be effective vehicles for disseminating an identified technology. Although the multinational enterprise is one of the most important and certainly the most controversial channels through which developing countries acquire technology from the industrialized countries, their criteria for supplying technology is primarily profit motivated. Corporate officials have been quoted as stating that unless their company is paid handsomely and allowed to keep control over the technology so that competitors can not get to it, they will not make the transfer (Goulet, (1976), p. 70). The attitude exhibited through this channel of technology transfer is quite in line with the concept of "no free lunch" - you must pay for something in order to achieve something. Without making any profit why should corporations be expected to give up their rights to make the money they deserve on the basis of their patent?

Basic needs strategy - "For effective economic growth to take place, people in the developing world must have technology that is appropriate to their specific needs" (USAID, (1986), P. 8). Help in the direct and indirect transfer of technology to the developing countries has come from agencies and lending institutions like USAID and the World Bank. Since the late 1970's, USAID has shifted its approach to meet the growing demand for "basic needs" strategy in contrast with "traditional" or "trickle-down" approaches to development. USAID has been very eloquent in endorsing the "basic needs" strategy and went as far as stating that, the international community can eradicate absolute poverty in the world within the next generation if it has the political will to adopt an international strategy to meet minimum human needs (Lappe, et. al, (1981), p. 160).

Similarly the World Bank has also been making a few changes that include offering "non-project" loans (sometimes called program loans) to the governments in the developing countries. The purpose of these loans is to assist both private and public sectors with foreign exchange payments for imports deemed essential (including technologies).

In using private voluntary organizations, universities, and foundations, transfer of technology is very much dictated by the goals of the donor agency, and are often oriented to the poor. However, even with the best of intentions, these groups are run by educated elite and are strongly swayed by the same class in the developing countries. Most of the technology directed toward basic needs comes from this group. In relative terms this group of institutions tends to have limited funds for development work.

Identification and Discussion of Shortcomings of the Selected Strategies

Top-down strategy - The strengths of this strategy are also its shortcomings in the sense that by targeting the educated elite as the group to pass technology through, their work is made much easier (relatively speaking) than say, if they were to target the lower income group and the poor who also happen to be the lesser educated. Actually in this strategy the donors and the recipients speak the same language. Whether it is a fitting strategy for development is a matter of contention. The shortcoming of this strategy is that by exclusively targeting the elite as their channel for technology transfer, it keeps the deserving majority (the needy) at bay indefinitely with very remote chances that the benefits will eventually trickle-down to them. Three decades is enough time to start asking for some tangible results of the concept. Since such evidence is hard to come by, it is doubtful whether it has succeeded in its mission - and that is definitely a weak point.

Intermediate technology strategy - The main concern of this strategy is some decision-makers in the developing countries try to match the development styles of the industrialized countries. They may be tempted to go for the big dollar technology and in the process destroy traditional workplaces much faster than modern workplaces can be created, thus leaving the populace in a worse position than ever before. The leadership attempts to circumvent the process of incrementally becoming more productive.

The logic behind the AT movement, as spearheaded by the intermediate technology strategy of Schumacher is undoubtedly very persuasive. It augurs well with the universal short-wise saying: "...cut your coat according to your size". If your savings are low and your technology is of the $1 type

as symbolically put by Schumacher, it does not make sense for you to go for the $1000 technology simply because you need to look developed. Indeed an intermediate technology that would cost something like $100 could be the right one to choose. But the short comings of this strategy is that it does not mention anything about exceptional cases where a high cost or skilled technology may still be desirable. Eckaus challenged AT (including intermediate technology) by arguing that the adjective 'appropriate' typifies the vagueness of the AT movement. In short, 'appropriate' can mean almost anything to anybody. By advocating intermediate technology, is Schumacher proposing that innovators in the developing countries not aim high or is he trying to suggest that developed countries should withhold the best and make the developing countries do with something inferior and outdated? Maybe not, but these are some questions which if not adequately answered could be interpreted as the weak points of the intermediate technology strategy.

From an economic point of view, given an amount of available capital, you may make a decision to either concentrate it all on a small number of highly capitalized workplaces, or you sparsely distribute it evenly over a large number of cheap workplaces. The latter case would result into less total output than if you employ the former, thus a failure of attaining rapid economic growth (Schumacher, 1973, p. 171).

Since intermediate technology is associated with labor intensive inputs while high technology is associated with capital intensive input, this implies intermediate technology may make matters worse in the already stunted economic growth in the developing countries.

The use of multinational corporations strategy - As was stated, the use of corporations to transfer technology to developing countries is based on their ability to compete and capture markets internationally. However this capability may turn out to be a 'two-edged' sword. Even though it might assist in infiltrating markets in the developing countries, it may also be counterproductive since one of the cornerstones of corporate criteria for involvement in ventures anywhere is to keep out competitors from a market already captured. One other glaring shortcoming of multinational corporations is their overbearing desire for profit maximization. Left to themselves, there is a suspicion that they might milk the economy of a young nation dry, bordering on "holding a national economy hostage". This selfish reputation has been earned by corporate institutions because of their excessive drive for profit maximization. In some developing countries, multinational corporations have been booted out en masse and their ventures nationalized by some so-called revolutionary leaders.

Are we asking too much for them to contribute their fair share in the transfer of technology to the developing countries by not overemphasizing profit?

Basic needs strategy - The number of projects in which USAID and the World Bank have featured prominently in providing technical assistance to the developing countries is huge and the shift in strategy to embrace the "basic needs" call in the developing countries is commendable. USAID sponsored and administered programs such as the Economic Support Fund, Functional Development Assistance, the Sahel Development Program, International Organizations and Programs, are just but a few of examples that have made a real difference in technology transfer to the developing countries.

Critics of these agencies charge that the rhetoric of the aid establishment is excellent but the establishment has been unable to live up to it because the U.S. government and agencies such as the World Bank have failed convincingly to ally themselves with the poor. This is attributed to lack of proper definition of the problem of poverty in their projects. (Lappe et.al, 1981, p. 11).

Instead USAID and agencies like the World Bank attempt to appease the multinational corporation lobbyists and the power brokers in the developing countries. As a result the rhetoric of "basic needs" strategy has not been sufficiently met. If this is the case, then why is there increased pressure for more aid? There are strong indications that the technology tied with aid has become increasingly politicized and that aid attached technology is being used on the principles of "a carrot and big stick."

The use of private voluntary organizations, universities and foundations' strongest attribute is their basic orientation to the poor. Their's is like a peace mission, usually with a long-term goal of cultivating some form of technology, for example; the establishment of basic institutions and technology that will accelerate development and at the same time improve the immediate welfare of the society. The most obvious shortcoming of this group as a vehicle for technology transfer is the relative lack of funds for development work. Yet another is the charge that they are very much directed by the goals of the donor agencies, sometimes in conflict with the desire/needs of the target group. For example, designing and developing a medium size solar dryer and then providing the concept and/or the actual model to the rural folks in a developing country. Would it <u>not</u> have been better to assess the needs of these people first and find out their views or preferences before designing a project <u>with</u> them and not <u>for</u> them?

<u>Discussion of Plan for Strengthening Technology Transfer Strategies</u>

The purpose and/or objectives of this paper will not be met if mention is not made of some means of strengthening the available strategies of technology transfer to the developing countries. For the sake of this paper, the following four factors will be discussed as the major components of a viable strategy for technology transfer: 1) Needs Assessment, 2) Target Group Involvement, 3) Evaluation, Follow-ups, 4) Questions on the Role of Technology Transfer in Projects.

<u>Needs assessment</u> - If there is a single factor that has led many technology transfer strategies astray, it is the lack of a "needs assessment" as a prerequisite or a component of technology transfer.

Rossi and Freeman (1986) defined needs assessment as a "Systematic appraisal of type, depth, and scope of problems as perceived by study targets and/or their advocates." (p. 104)

It is not uncommon to find some technologies designed for transfer to developing countries are rejected or fall dead on arrival as they are not in the priorities of the target group. The following are some procedures that could strengthen technology transfer strategies as listed by Dr. Robert Fuller, (a Visiting Professor of International Program Development Evaluation at the University of Idaho, Fall 1986): 1) Key Informant Approach, 2) Community Forum Approach, 3) Indicators Approach and 4) Surveys and Censuses.

For the purpose of this paper only number 1 and 2 will be discussed.

The Key Informant Approach involves identifying, selecting, and questioning knowledgeable leaders or experts in order to construct estimates of target problems and populations. When incorporated as a component of a technology designed for transfer this technique would provide a broad picture of the needs and services perceived as important and also the characteristics of the population requiring them.

The Community Forum Approach is usually designed to draw from the experience of the entire community. It is in part a technique to gain citizen involvement but in addition to this, it can also be used to obtain estimates from a variety of individuals about the incidence and prevalence of particular problems and about the identifiable characteristics of the target. This approach is sometimes used as a follow-up to the Key Informant Approach.

Target group involvement - this is one factor that could boost the strength and/or ultimate success to many strategies of technology transfer because when people in the target group are consulted for their opinions and feelings on a new technology that is going to affect them, the degree of involvement and appreciation or cooperation will increase dramatically. If a rural community is targeted for pure drinking water supply via drilling of wells, it would not be enough to just move heavy drilling equipment into their midst and start drilling the wells. The community's opinion on the issue of a lack of pure drinking water should be solicited by asking questions such as: Do you think the lack of pure drinking water in this community is a major problem? If so, how would you like the problem to be solved? Are there other community problems which you think should get a higher priority than pure drinking water? Would you or other people you know be interested in using pure drinking water from the well? These kind of questions would promote the project and make it be understood and supported by the community it is designed to help. The crucial moment for the transfer of a technology is at the time of implementation. If the target group is involved in the design and/or early planning, the diffusion of that technology will spread more rapidly. Rossi and Freeman (1986) list the following formal questions to be answered for a good target group involvement by policymakers, planners, and funding organizations involved in the transfer of technology:

> *What is the nature and scope of the problem requiring actions?*
> *What interventions may be undertaken to ameliorate the problem significantly?*
> *What is the appropriate target group for intervention?*
> *Is the intervention reaching that target population?*
> *Is the intervention being implemented in the ways envisioned?*
> *Is it effective? (p. 18)*

Evaluation, follow-up - According to Rossi and Freeman (1986):

> *Evaluations are undertaken for a variety of reasons: to judge the worth of ongoing programs and to estimate the usefulness of attempts to improve them; to assess the utility of innovative programs and initiatives; to increase the effectiveness of program management and administration; and to meet various accountability requirements. (p. 13)*

If a group of small-scale farmers are targeted for a fleet of tractor donations by a developed country, is it enough to transfer the tractors to the farmers, show them how to operate them and then end the activity? Experience shows that in addition to the donation of tractors there will be a need for servicing them in case of a breakdown. Hence a mechanics shop should be started in the vicinity and mechanics trained to do the job. Thereafter an evaluation or a follow-up should be conducted to determine whether the technology has been successfully transferred and is being used effectively. Thus evaluation and/or follow-up programs should be incorporated as part of a technology transfer strategy.

The Relevance of Technology Transfer in Development Projects - It is usually assumed that for any development to take place it must involve some kind of technological improvement. But one question that is not often asked is "can development take place without technology?" For all practical purposes it is believed that technology is an integral part of development. But what is not given much consideration is the fact that the necessary technology may not have to come from abroad.

There is a current strong postulation that instead of transferring technology to the developing countries, efforts should be made to identify indigenous technologies already in place in these countries and use them as springboards for any further advancement. It has been pointed out that new technologies being transferred to developing countries have sometimes worsened instead of improved the lot of the ordinary people originally intended to be helped. So the call for technologies that could be used to 'build on' rather than replace the ones already in existence in the developing countries is growing louder.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion: Enough has already been written on the definition of what is 'appropriate' and what is 'inappropriate' technology. The term appropriate technology itself may be ill-defined since the adjective 'appropriate' tends to mean anything to anybody. And for this reason, a 'working definition' that takes into consideration the views and/or perception of all the parties concerned must be found.

Recommendation: A 'working definition' of appropriate technology should include the following features: 1) a needs assessment component, 2) skill level that reflects the aspirations of the target group and 3) cost that is within the resource endowment of the target group. But the paramount ingredient of the definition is that the technology should be people oriented.

Conclusion: There are already suitable channels of technology transfer to the developing countries, but each and every one of them discussed here are plagued with shortcomings of varying magnitudes and importance. The "trickle-down" strategy has questionable effectiveness as shown by the lack of evidence that it has worked to address the basic needs.

Recommendation: Each of the selected strategies for transfer of technology to the developing countries discussed in this paper could be made more viable or stronger by including in their initial design: 1) Needs assessment, 2) Target group involvement, 3) Evaluation, Follow-up and 4) Consideration of the relevant role of technology transfer in development.

Conclusion: There is a tendency by the present strategies of technology transfer to replace the traditional technologies in existence in the developing countries and this does not match well with the current universal call for addressing "basic needs" in technology transfer to these countries.

Recommendation: Where indigenous technologies in the developing countries have outlived their usefulness, of course there should not be any hesitation to replace them. However, we must hasten to recommend that the primary concern should not be with replacement of indigenous technologies indiscriminately but rather, where possible technologies designed for transfer should aim at building upon the indigenous ones already in place in the developing countries.

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